

**HYLURGOPS PALLIATUS (GYLLENHAL) (COLEOPTERA: CURCULIONIDAE: SCOLYTINAE), AN EURASIAN BARK BEETLE NEW TO NORTH AMERICA**

E. RICHARD HOEBEKE AND ROBERT E. ACCIAVATTI

(ERH) Department of Entomology, Cornell University, Ithaca, NY 14853, U.S.A. (e-mail: erh2@cornell.edu); (REA) NA, Forest Health Protection, USDA Forest Service, Morgantown, WV 26505, U.S.A. (e-mail: racciovatti@fs.fed.us)

---

*Abstract.*—*Hylurgops palliatus* (Gyllenhal), a widespread and abundant bark beetle in Europe and elsewhere in the Old World, is reported for the first time from North America, based on specimens collected between 2001 and 2004 from New York, Ohio, and Pennsylvania. This bark beetle was collected from baited Lindgren funnel traps, part of a USDA, Forest Service and APHIS National Early Detection Pilot Project surveying ports for exotic Curculionidae: Scolytinae (bark and ambrosia beetles). The native distribution, biology, and habits of this newly arrived Palearctic species are summarized from the European literature. An existing key to North American species of *Hylurgops* LeConte is modified to include this newly detected immigrant. A diagnosis and habitus photographs of the adult are provided for recognition of this species.

*Key Words:* Coleoptera, Curculionidae, Scolytinae, *Hylurgops*, North America, exotic species, new records

---

Various exotic species unintentionally introduced into North America represent a serious threat to the integrity of North American forest ecosystems. An Exotic Pest Rapid Detection Team (EPRDT), under the joint auspices of the USDA Forest Service and USDA-APHIS, was established in 2001 to develop effective national strategies for the early detection and rapid response to exotic forest pests. The EPRDT promulgated national strategies for the early detection of exotic bark and ambrosia beetles (Curculionidae: Scolytinae) and implemented pilot trapping surveys with a high degree of emphasis placed on the expert identification skills of participating taxonomists.

The National Early Detection and Rapid Response (EDRR) Pilot Project for 2001 involved trapping surveys using host volatiles and pheromones specific to bark beetles as baits placed on Lindgren funnel traps at

nine ports in three regions (3 ports each in the Northeast, Southeast, and Western regions). As a result of the 2001 Northeastern regional survey, the Eurasian species, *Hylurgops palliatus* (Gyllenhal), was detected for the first time in North America. Species identity was confirmed by the senior author, based on the initial trapping of 11 specimens in a small planted stand of mixed conifers [*Pinus sylvestris* L., *P. resinosa* Aiton, and *Picea abies* (L.) Karsten] at an industrial site in Erie, Pennsylvania, on 17 April 2001; 2 more specimens were trapped at the same site on 2 May 2001. In subsequent years, EDRR provided a rapid response to this initial discovery through delimiting surveys for *H. palliatus* in NY, OH, and PA at sites with the above coniferous hosts. Additional recoveries of this exotic bark beetle were made from other baited Lindgren funnel traps placed at several lo-

cations in Erie County, PA, in 2002 and from many traps placed in surrounding counties in NY, OH, and PA in 2003 and 2004.

This paper reviews known and published information about *H. palliatus*. Herein, we provide: 1) a list of distributional records and a map for this newly detected bark beetle in the eastern United States; 2) a diagnosis and revised species key for facilitating its recognition in North America; 3) a summary of its native distribution, host tree preferences, biology and habits, and interceptions; and 4) its response to lures used with the EDRR traps.

- Hylurgops palliatus* (Gyllenhal)
- Hylesinus palliatus* Gyllenhal 1813: 340.
- Hylastes palliatus*: Thomson 1865: 349.
- Hylastes (Hylurgops) palliatus*: Reitter 1894: 63.
- Hylurgops palliatus*: Reitter 1913: 50.

Diagnosis.—*Hylurgops palliatus* is superficially similar to some species of the genus *Hylastes* Erichson, but can be differentiated by the following combination of characters: pronotum with a noticeable anterior constriction (Fig. 1), usually with about equal numbers of larger and small punctures intermixed on the disc; third tarsal segment broad, bilobed; elytra broadened posteriorly; elytral declivity usually with sparse, uniseriate rows of fine, erect, hairlike, interstitial setae; scalelike vestiture of elytra present from base to apex of declivity, more numerous on apical third; interstitial tubercles in a single row; small species, total length 2.5–3.2 mm (Wood 1982, Cavey et al. 1994).

To accommodate *H. palliatus*, couplet #7 (pg. 83) of Wood’s (1982) key to the North and Central American species of *Hylurgops* should be modified as follows (**alterations in boldface**):

- 7. Scalelike elytral vestiture confined to declivity, or extending anteriorly to middle of elytral disc; interstitial raised tubercles confused, not uniseriate; total length > 3.2 mm . . . . . 7a

- Scalelike elytral vestiture present from base of elytra to apex of declivity, more numerous on apical third; interstitial tubercles in a single row; total length 2.5–3.2 mm; New York, Pennsylvania, and Ohio (introduced from Europe) . . . . . *palliatus* (Gyllenhal)
- 7a. Scalelike elytral vestiture confined to declivity; elytral disc with only a few crenulations in uniseriate rows, these usually narrow and more nearly tuberculate, most interstitial punctures on middle half almost normal (not crenulate); setae on lateral and basal margins of pronotum very fine; pronotum reticulate; 3.6–4.8 mm; California to Coastal British Columbia and Alaska . . . . . *rugipennis rugipennis* (Mannerheim)
- Scalelike elytral vestiture expanding anteriorly to middle of elytral disc; elytral disc with most interstitial punctures crenulate or subcrenulate, confused; setae on lateral and basal margins of pronotum coarse; pronotum smooth, shining; 3.7–5.2 mm; Utah and Colorado to inland British Columbia and east through the coniferous forest to Nova Scotia and Alabama . . . . . *rugipennis pinifex* (Fitch)

Native distribution.—*Hylurgops palliatus* is widely distributed in the Old World, including Africa (Algeria), Asia (Heilongjiang in China, Japan, Korea, Turkey, and Sakhalin Island, Siberia, and Ussuri in eastern USSR), and Europe (Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, England, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, and Yugoslavia) (Wood and Bright 1992).

Biology, hosts, and habits.—*Hylurgops palliatus*, considered a non-aggressive bark beetle (Volz 1988) or so-called ‘secondary’ species (Perttunen 1957), colonizes stems and crowns of dying, decayed, or damaged conifers (Escherich 1923; Byers 1992), with some preference for Norway spruce (*Picea abies*) in the initial stages of deterioration (Nuorteva 1956; Kohnle 2004). Host selection is largely governed by olfactory recognition of host-specific volatiles (terpene mix) and ethanol (Schroeder 1988, Volz 1988, Byers 1992, Kohnle 2004). A study by Perttunen (1957), however, showed that *H. palliatus* was strongly re-



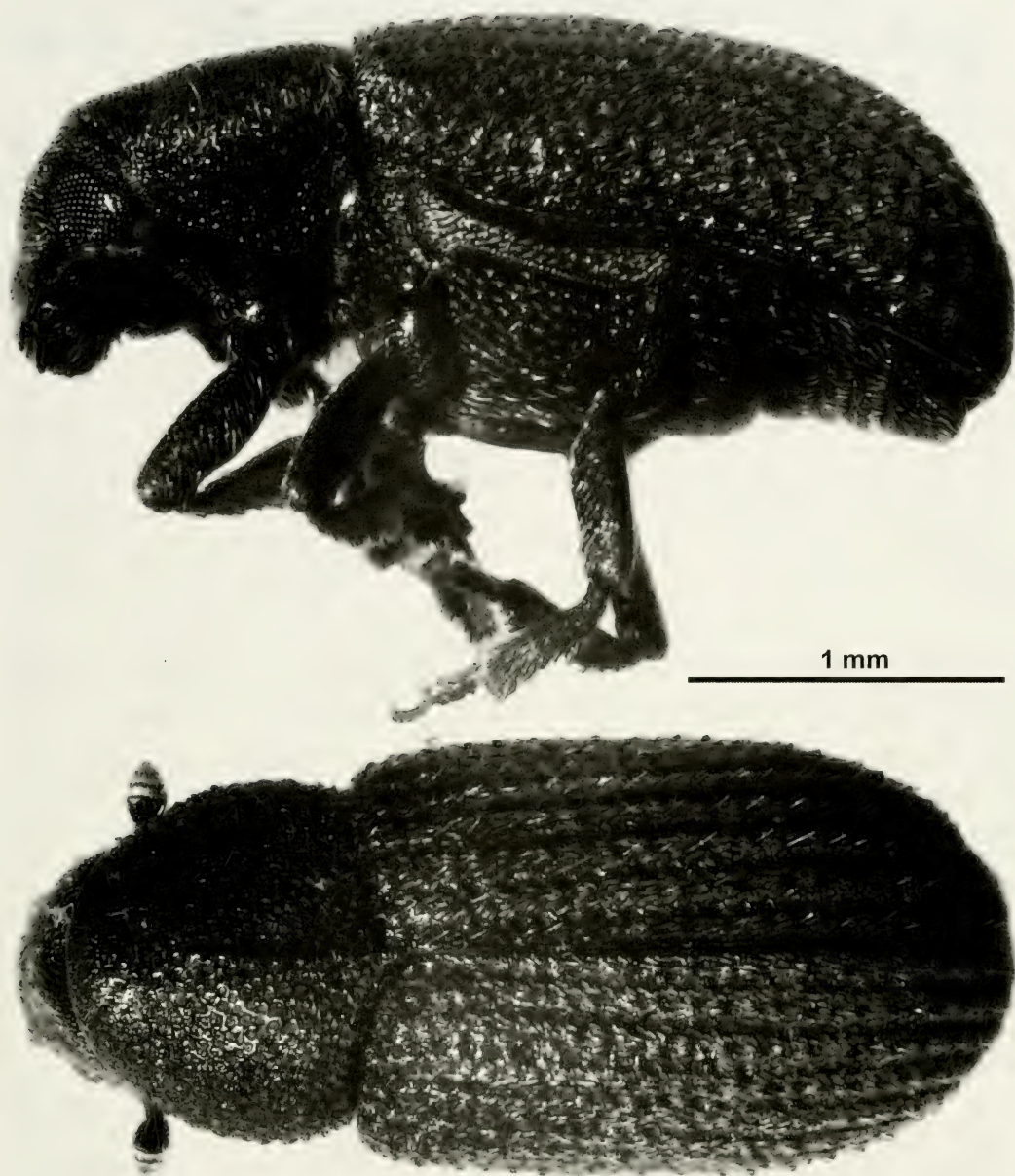


Fig. 1. *Hylurgops palliatus*. Lateral aspect (top) and dorsal aspect (bottom). Scale line = 1 mm.

pelled by a high concentration of the terpene alpha-pinene, and only slightly repelled by a low concentration. Others (Kohnle 1985, Klimetzek et al. 1986, Volz 1988) have found that *H. palliatus* responds to ethanol alone, and that increasing ethanol concentrations actually enhances the response of adults to monoterpenes.

Female beetles produce a single, longitudinal egg gallery, 3–5 cm in length (Schwenke 1974; Brauns 1991). Larval feeding tunnels may be individual for their entire length, or may merge occasionally and again separate, forming a characteristic branched pattern and terminate in pupal cells (Browne 1968). Egg and larval galler-

ies are illustrated by Escherich (1923, Abb. 292, p. 568), Schwenke (1974, Abb. 156C, p. 396), and Brauns (1991, Abb. 482, p. 604). In Europe, most workers record 2 flight periods, one in March/April and another in July, thus indicating 2 generations annually (Escherich 1923; Braun 1991). Maturation feeding by the adults occurs in the bark of the hosts. The species is monogamous. Adults are known to overwinter in the soil (Balachowsky 1949). Because this beetle is essentially a secondary invader of unhealthy trees, and frequently follows an infestation by pine shoot beetle, *Tomicus piniperda* (L.), it is generally not considered an important pest species (Balachowsky 1949; Browne 1968). In its native Eurasian range, its known host taxa are extensive, including the following conifers: *Abies alba* Miller, *A. sibirica* Ledebour, *A. nordmanniana* (Steven) Spach, *Larix decidua* Miller, *L. gmelinii* Ruprecht (Rupr. ex Kuzeneva), *L. sibirica* Ledebour, *Picea abies*, *P. glehnii* (Friedr. Schmidt), *P. jezoensis* (Siebold & Zuccarini) Carrière, *P. koyamai* Shirasawa, *P. microsperma* (Lind.) Carrière, *P. obovata* Ledebour, *P. omorika* (Pancic) Purkyne, *P. orientalis* (L.) Link, *Pinus cembra* L., *P. leucodermis* Antoine, *P. mugo* Turra, *P. nigra* Arnold (and its various subspecies), *P. peuce* Grisebach, *P. pinaster* Aiton, *P. pinea* L., *P. radiata* D. Don, *P. rotundata* Link (Moor-Bergkieser), *P. sibirica* (Du Tour) Krylov, *P. strobus* L., *P. sylvestris*, *P. uncinata* Miller ex Mirbel, and *Cedrus* spp. (Wood and Bright 1992, Lombardero 1994, Bright and Skidmore 1997).

Interceptions.—*Hylurgops palliatus* was one of ten targeted bark and ambrosia beetles selected for the National Early Detection and Rapid Response Pilot project, based on the frequency and number of interceptions of this species at U.S. ports-of-entry. It is the third most frequently intercepted bark beetle in the United States, with 295 interceptions from 20 countries for the period 1985–2000 (Haack 2001). In Canada, this bark beetle was intercepted from

imported cargoes on at least 5 occasions from April 1, 1997–March 31, 2000 (CFIA 2002).

New North American records.—All records of *H. palliatus* listed below and mapped in Fig. 2 are based on specimens collected from baited Lindgren funnel traps set at selected sites from mid-March through late May, 2001–2004. Traps were fitted with collection cups partially filled with propylene glycol (low toxicity) and water (1:1, vol./vol.). Rain and snow often diluted this volume beyond the 1:1 ratio. Traps were generally checked every two weeks. The year each site was trapped, with the number of specimens collected in parentheses, is noted below. Voucher specimens have been deposited in the Cornell University Insect Collection, Ithaca, NY; the National Museum of Natural History, Smithsonian Institution, Washington, DC; and the Carnegie Museum of Natural History, Pittsburgh, PA.

UNITED STATES: NEW YORK: *Cattaraugus Co.*, Allegany State Park, 2003 (1). *Chautauque Co.*, Panama, 2003 (1). OHIO: *Ashtabula Co.*, Monroe Center, 2003 (50); Pymatuning State Park, 2003 (121). *Columbiana Co.*, Beaver Creek State Park, 2004 (1); New Waterford, 2004 (1). *Cuyahoga Co.*, Oakwood, 2004 (12). *Geauga Co.*, Parkman, 2004 (55); Thompson, 2004 (19). *Lake Co.*, Leroy Center, 2004 (9); North Madison, 2004 (16). *Mahoning Co.*, Meander Reservoir, 2004 (10); North Lima, 2004 (9). *Portage Co.*, Garrettsville, 2004 (172); Mantua Corners, 2004 (17). *Summit Co.*, Cuyahoga Valley NP, Horseshoe Pond, 2004 (6); Cuyahoga Valley NP, Oak Hill, 2004 (1). *Trumbull Co.*, Youngstown State University Arboretum, 2003 (9). *Tuscarawas Co.*, Beach City Dam, 2004 (1). PENNSYLVANIA: *Allegheny Co.*, Beechwood Farms ANC, 2004 (4); Wexford, 2004 (1). *Beaver Co.*, New Galilee, 2004 (1). *Butler Co.*, Annandale, 2004 (1); Moraine State Park, 2004 (3). *Crawford Co.*, Crossingville, 2003 (204); New Richmond, 2003 (83); Riceville, 2003 (25);





Fig. 2. *Hylurgops palliatus* survey in Ohio, Pennsylvania, and New York, 2001–2004. Solid circles = site surveyed, specimens trapped. Open circles = site surveyed, no specimens trapped.

Table 1. *Hylurgops palliatus* trap catch by lure type and year.

| Lure Type              | Year     | Total Number |
|------------------------|----------|--------------|
| Ethanol + alpha-pinene | 2001     | 14           |
|                        | 2002     | 78           |
|                        | 2003     | 470          |
|                        | 2004     | 369          |
|                        | Subtotal | 931          |
| Ethanol only           | 2001     | 1            |
|                        | 2002     | 50           |
|                        | 2003     | 229          |
|                        | 2004     | 59           |
|                        | Subtotal | 339          |
| Chalcoprax®            | 2002     | 19           |
|                        | Subtotal | 19           |
| Ipslure®               | 2002     | 8            |
|                        | 2003     | 15           |
|                        | 2004     | 1            |
|                        | Subtotal | 24           |
|                        | Total    | 1,313        |

Shermansville, 2003 (138). *Erie Co.*, Corry, 2003 (17); Erie (Asbury Nature Center), 2002, 2004 (175); Erie (Eriez Magnetics), 2001, 2002, 2004 (51); Erie (Riehl Nursery), 2002 (19); Tracy, 2003 (27). *Lawrence Co.*, Edinburg, 2003, 2004 (13); Mount Jackson, 2004 (8); Plain Grove, 2003 (3). *Mercer Co.*, Camp Perry, 2003 (9); Mercer, 2003 (9). *Venango Co.*, Polk, 2003 (2); Wallaceville, 2003 (3). *Warren Co.*, Chandlers Valley, 2003 (1); Hearts Content, 2004 (1); Youngsville, 2003 (3). *Washington Co.*, Hillman State Park, 2003 (1).

Commercial lures as baits.—Lindgren traps used in this EDRR survey were baited with one of four commercial lures or lure combinations. The trap catches of *H. palliatus* to the lures are shown in Table 1. The lures, available from PheroTech, Inc. (Delta, BC) included:

- 1) Ultra-high release (UHR) ethanol only.

- This is a general attractant for wood-boring insects in deciduous hosts. Ethanol is a degradation product from the phloem of weakened and dying trees.
- 2) UHR alpha-pinene and UHR ethanol together. Alpha-pinene, a monoterpene, is a volatile from coniferous hosts and provides strong attraction for many wood-boring insects, especially bark beetles.
  - 3) Exotic Ipslure®. This is another attractant (with the 3 components: cis-verbenol, ipsdienol, and methyl butenol) specific for conifer-feeding exotic bark beetles [such as the Palearctic species *Ips typographus* (L.) *Ips sexdentatus* (Boerner), *Hylurgus ligniperda* (F.), and *Orthotomicus erosus* (Wollaston)].
  - 4) Chalcoprax®, a specific lure for *Pityogenes chalcographus* (L.).

#### ACKNOWLEDGMENTS

We thank Helen Butalla and Ann Stekette (USDA Forest Service, Morgantown, WV) for providing a compilation of all locality data for *H. palliatus* captured over the survey period and for mapping this locality data, respectively. Kent Loeffler (Department of Plant Pathology, Cornell University, Ithaca, NY) provided the habitus photographs of *H. palliatus*. We also are grateful to Robert J. Rabaglia (Maryland Department of Agriculture, Annapolis) and James R. LaBonte (Oregon Department of Agriculture, Salem) for providing helpful comments on a draft of the manuscript.

#### LITERATURE CITED

- Balachowsky, A. 1949. Coleopteres Scolytides. Faune de France 50: 1–320.
- Brauns, A. 1991. Taschenbuch der Waldinsekten: Grundriss einer terrestrischen Bestandes- und Standort-Entomologie. G. Fischer Verlag, Stuttgart, 860 pp.
- Bright, D. E. and R. E. Skidmore. 1997. A catalog of Scolytidae and Platypodidae (Coleoptera), Supplement 1 (1990–1994). NRC Research Press, Ottawa, Ontario, 368 pp.
- Browne, F. G. 1968. Pest and diseases of forest plantation trees: an annotated list of the principal species occurring in the British Commonwealth. Clarendon Press, Oxford, UK, 1,330 pp.
- Byers, J. A. 1992. Attraction of bark beetles, *Tomicus piniperda*, *Hylurgops palliatus*, and *Trypodendron domesticum* and other insects to short chain alcohols and monoterpenes. Journal of Chemical Ecology 18: 2385–2402.
- Cavey, J., S. Passoa, and D. Kucera. 1994. Screening aids for exotic bark beetles in the northeastern United States. USDA, Forest Service, Northeastern Area. NA-TP-11-94, 19 pp.
- CFIA (Canadian Food Inspection Agency). 2002. Intercepted plant pests, 1997–2000. <http://www.inspection.gc.ca/english/sci/lab/cpqp/introe.shtml> (accessed 12 February 2005).
- Escherich, K. 1923. Die Forstinsekten Mitteleuropas. Band 2, P. Parey, Berlin, pp. 519–532, 568–572.
- Gyllenhal, L. 1813. Insecta Svecica descripta. Claris I. Coleoptera Sive Eleuterata. Leverentz, Scaris, Vol. I, pt. 3, 730 pp..
- Haack, R. A. 2001. Intercepted Scolytidae (Coleoptera) at U.S. ports of entry: 1985–2000. Integrated Pest Management Reviews 6: 253–282.
- Klimetzek, D., J. Köhler, J. P. Vité, and U. Kohnle. 1986. Dosage response to ethanol mediates host selection by 'secondary' bark beetles. Naturwissenschaften 73: 270.
- Kohnle, U. 1985. Untersuchungen über die Pheromonsysteme sekundärer Borkenkäfer (Col., Scolytidae). Zeitschrift für Angewandte Entomologie 100: 197–218.
- . 2004. Host and non-host odour signals governing host selection by the pine shoot beetle, *Tomicus piniperda* and the spruce bark beetle, *Hylurgops palliatus* (Col., Scolytidae). Journal of Applied Entomology 128(9–10): 588–592.
- Nuorteva, M. 1956. Über den Fichtenstamm-Bastkäfer, *Hylurgops palliatus* Gyll., und seine Insektenfeinde. Acta Entomologica Fennica 13: 1–116.
- Lombardero, M. J. 1994. Estudio de los Scolytidae (O. Coleoptera) de Galicia. Departamento de Biología Animal, Universidad de Santiago de Compostela, Santiago de Compostela.
- Perttunen, V. 1957. Reactions of two bark beetle species, *Hylurgops palliatus* Gyll. and *Hylastes ater* Payk. (Col., Scolytidae) to the terpene  $\alpha$ -pinene. Annales Entomologici Fennici 23: 101–110.
- Reitter, E. 1894. Bestimmungs-Tabellen der Borkenkäfer (Scolytidae) aus Europa und den angrenzenden Ländern. Verhandlungen des Naturforschenden Vereines in Brünn 33: 36–97.
- . 1913. Bestimmungs-Tabelle der Borkenkäfer (Scolytidae) aus Europa und den angrenzenden Ländern. Wiener Entomologische Zeitung 32 (Beiheft): 1–116.
- Schroeder, L. M. 1988. Attraction of the bark beetle *Tomicus piniperda* and some other bark- and wood-living beetles to the host volatiles alpha-pinene and ethanol. Entomologia Experimentalis et Applicata 46: 203–210.

- Schwenke, W. 1974. Die Forstschädlinge Europas: ein Handbuch in fünf Bänden/unter Mitwirkung zahlreicher Wissenschaftler. Zweiter Band (Käfer). P. Parey, Hamburg, 500 pp.
- Thomson, C. G. 1865. Skandnaviens Coleoptera, synoptiskt bearbetade, af C. G. Thomson. Tom. VII. Tryckt Uti Lundbergska Boktryckeriet, Lund, 394 pp.
- Volz, H.-A. 1988. Monoterpenes governing host selection in the bark beetles *Hylurgops palliatus* and *Tomicus piniperda*. Entomologia Experimentalis et Applicata 47: 31–35.
- Wood, S. L. 1982. The bark and ambrosia beetles of North and Central America (Coleoptera: Scolytidae), a taxonomic monograph. Great Basin Naturalist Memoirs 6: 1–1359.
- Wood, S. L. and D. E. Bright. 1992. A catalog of Scolytidae and Platypodidae (Coleoptera), Part 2: taxonomic index. Great Basin Naturalist Memoirs 13: 1–1553.